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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/321,390	05/27/99	LESIEUR	R

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EXAMINER	
RIDLEY, B	
ART UNIT	**PAPER NUMBER**
1764	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/321,390	LESIEUR, ROGER R.	
	Examiner	Art Unit	
	Basia Ridley	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-19,21 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-19,21 and 22* is/are rejected.

7)☒ Claim(s) *1-7,9-18 and 21* is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☒ The proposed drawing correction filed on *28 August 2000* is: a)☒ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner. by examiner

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☐ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☐ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

- use of term "catalyzed cells" throughout the specification. It is not clear to the examiner what is meant by this term. Are cells of the catalyst bed being changed by a catalytic reaction (being catalyzed)? Is the catalyst used to catalyze cells of the catalyst bed in addition to catalyzing the reforming reaction of fuel gas?

Appropriate correction is required.

Claim Objections

2. Claims 1-7, 9-18 and 21 are objected to because of the following informalities:

in claims 1 and 21, the term "an process fuel gas stream outlet passage" (line 8 of both claims) is objected to, suggested correction is --a process fuel gas stream outlet passage--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-7, 9-18 and 21-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 21-22 recite the limitation "the fuel gas" (line 4 of all aforementioned claims). There is insufficient antecedent basis for said limitation in the claim. Proposed correction is --a fuel gas--.

Claims 1 and 21-22 recite the limitation "catalyzed cells" (line 5 of claim 1 and line 6 of claims 21-22). It is not clear to the examiner what is meant by this limitation. Are cells of the catalyst bed being changed by a catalytic reaction (being catalyzed)? Is the catalyst used to catalyze cells of the catalyst bed in addition to catalyzing the reforming reaction of fuel gas?

Claims 1 and 21 recite the limitation "the processed gas stream" (lines 9-10 and 12 of claim 1 and in lines 9-10 of claim 21). There is insufficient antecedent basis for said limitation in the claim. Proposed correction: in lines 9-10 of both claims change "the processed gas stream" to --a processed gas stream-- and insert --the-- before "processed" in line 12 of claim 21.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 19, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233).

Clawson discloses a similar autothermal reformer assembly (Fig. 3), the assembly comprising:

a) a catalyst bed (200) including an inlet end (210) and an outlet end (270);

b) a fuel gas/steam mixture inlet passage (208, P20/L7-9);

c) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a cylindrical monolithic open cell foam.

Narumiya et al. teaches a catalyst bed comprising:

- a cylindrical monolithic open cell foam structure (Fig. 1, C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

7. Claims 1-6, 9-12 and 16-18, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), as set forth above, and further in view of Setzer et al. (USP 4,415,484).

Regarding claims 1 and 16, Clawson discloses a similar autothermal reformer assembly (Fig. 3), the assembly comprising:

a) a catalyst bed (200) including an inlet end (210) and an outlet end (270); wherein

- an inlet portion of said catalyst bed is operable to combust a portion of the fuel gas (P24/L1-7);

b) a fuel gas inlet passage (208); wherein

- said fuel gas inlet passage (208) being disposed in heat exchange relationship with an processed fuel gas stream outlet passage (224) from said catalyst bed (P20/L9-11 & P21/L7-10);

c) an air inlet passage (232); and

- said air inlet passage (232) being disposed in heat exchange relationship with processed gas stream (P22/13-15)

d) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a cylindrical monolithic open cell foam.

With respect to Narumiya et al. the same comments apply as set forth above.

While Clawson does disclose combusting portion of the fuel gas in the inlet portion of the reactor, the reference does not disclose the catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas.

Setzer et al. teaches an inlet portion of a catalyst bed being provided with:

- a catalyst which is operable to combust a portion of the fuel gas (C4/L42-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a catalyst which is operable to combust a portion of the fuel gas, as taught by Setzer et al., in the inlet portion of the catalyst bed of Clawson, for the purpose of allowing greater flexibility in the maximum allowable reactor temperature and the method of introducing the air into the reactor.

Regarding claims 2-5, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said catalyst bed includes a noble metal and calcium oxide (C2/L5-6);
- said foam catalyst bed comprises at least two catalyzed regions (C4/L59-63); wherein
- each region has a different catalyst composition (C4/L59-63);
- a first region of said foam catalyst bed contains a noble metal catalyst in combination with calcium oxide (C3/L21-22 & C4/L53-55);
- a second region of said foam catalyst bed contains a base metal catalyst in combination with calcium oxide (C3/L20-21 & C4/L45-46).

Regarding claims 6 and 9, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above, additionally, while the

references do not explicitly disclose said first region containing platinum catalyst and said second region containing a nickel catalyst, both nickel and platinum catalysts were well known in the art at the time the invention was made (as evidenced by Clawson (P19/L27-P20/L7)), the catalyst selection being driven by system requirements, such as desired catalyst activity, and by catalyst cost. As the instant specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a platinum catalyst in said first region and a nickel catalyst in said second region of the catalyst bed, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of obtaining desired catalyst activity.

Regarding claims 10-11, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said catalyst bed includes a first region which contains a noble metal catalyst and calcium oxide catalyst (C4/L53-55);
- said noble metal catalyst is selected from the group consisting of platinum, palladium, rhodium and mixtures thereof (C4/L53-55).

While Clawson, in view of Narumiya et al. and further in view of Setzer et al. do not explicitly disclose said second region containing noble metal catalyst and not containing calcium oxide, noble metal catalyst not containing calcium oxide were well known in the art at the time the invention was made (as evidenced by Clawson (P19/L27-P20/L7)), the catalyst selection being driven by system requirements, such as desired catalyst activity, and by catalyst cost. As the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal catalyst not containing

calcium oxide, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of obtaining desired catalyst activity.

Regarding claim 12, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above. Additionally Narumiya et al. teaches an assembly, wherein:

- said foam catalyst bed includes at least one ceramic foam support body (C2/L45-49).

Regarding claims 17-18, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above. Additionally Clawson discloses an autothermal reformer assembly, wherein:

- said fuel gas inlet passage contains a fuel gas/steam mixture (P23/L8-14);
- said air inlet passage contains air (P23/L19-22).

While Clawson, in view of Narumiya et al. and further in view of Setzer et al. do not explicitly disclose said air inlet passage containing an air/steam mixture, the usage of steam as a temperature modifier and to avoid soot formation in partial oxidation of hydrocarbons was well known in the art at the time the invention was made (as evidenced by Bhattacharyya et al. (USP 5,498,370)). As the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add steam to the said air inlet passage, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of using the steam as a temperature modifier and to avoid soot formation.

8. Claims 13-15, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), further in view of Setzer et al. (USP 4,415,484), as set forth above, and further in view of Sheller. (USP 5,384,099).

Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose all of the claim limitations as set forth above, but the references do not disclose the catalyst bed comprising a metal support selected from the group consisting of stainless steel, nickel alloys and iron-aluminum alloys, connected to a source of electrical current so as to serve as a resistance heating element by being heated to operating temperature within about twenty seconds of applying electrical current thereto.

Sheller teaches a monolithic catalyst bed, wherein:

- said catalyst bed includes a metal support selected from the group consisting of stainless steel, nickel alloys and iron-aluminum alloys (C1/L26-29);
- said metal support is connected to a source of electrical current, so as to serve as a resistance heating element (C1/L52-63);
- said metal support is electrically heated to operating temperature within about twenty seconds of applying electrical current thereto (C1/L65-66).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a metal support connected to a source of electrical current, as taught by Sheller, in the catalyst bed of Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of activating the catalyst during the start up of the reformer.

9. Claims 1, 7 and 21, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), as set forth above, and further in view of Setzer et al. (USP 4,451,578).

Regarding claim 1, Clawson discloses a similar autothermal reformer assembly (Fig. 3), the assembly comprising:

a) a catalyst bed (200) including an inlet end (210) and an outlet end (270); wherein

- an inlet portion of said catalyst bed is operable to combust a portion of the fuel gas (P24/L1-7);

b) a fuel gas inlet passage (208); wherein

- said fuel gas inlet passage (208) being disposed in heat exchange relationship with an processed fuel gas stream outlet passage from said catalyst bed (P20/L9-11 & P21/L7-10);

c) an air inlet passage (232); and

- said air inlet passage (232) being disposed in heat exchange relationship with processed gas stream (P22/13-15)

d) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a monolithic open cell foam.

With respect to Narumiya et al. the same comments apply as set forth above.

While Clawson does disclose combusting portion of the fuel gas in the inlet portion of the reactor, the reference does not disclose the catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas.

Setzer et al. teaches an inlet portion of a catalyst bed being provided with:

- a catalyst which is operable to combust a portion of the fuel gas (C5/L53-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a catalyst which is operable to combust a portion of the fuel gas, as taught by Setzer et al., in the inlet portion of the catalyst bed of Clawson, for the purpose of allowing greater flexibility in the maximum allowable reactor temperature and the method of introducing the air into the reactor.

Regarding claim 7, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said first region contains an iron oxide/calcium oxide catalyst, and said second region contains a nickel catalyst (C5/L53-61).

Regarding claim 21, Clawson discloses a similar autothermal reformer assembly (Fig. 3), the assembly comprising:

a) a catalyst bed (200) including an inlet end (210) and an outlet end (270); wherein

- an inlet portion of said catalyst bed is operable to combust a portion of the fuel gas (P24/L1-7);

b) a fuel gas inlet passage (208); wherein

- said fuel gas inlet passage (208) being disposed in heat exchange relationship with an processed fuel gas stream outlet passage from said catalyst bed (P20/L9-11 & P21/L7-10);

c) an air inlet passage (232); and

- said air inlet passage (232) being disposed in heat exchange relationship with processed gas stream (P22/13-15)

d) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a monolithic open cell foam.

With respect to Narumiya et al. the same comments apply as set forth above.

While Clawson does disclose combusting portion of the fuel gas in the inlet portion of the reactor, the reference does not disclose the catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas.

Setzer et al. teaches an inlet portion of a catalyst bed being provided with:

- a catalyst which is operable to combust a portion of the fuel gas (C5/L53-59);
- said catalyst bed being provided with promoted catalyst (C2/L29-30).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a catalyst which is operable to combust a portion of the fuel gas, as taught by Setzer et al., in the inlet portion of the catalyst bed of Clawson, for the purpose of allowing greater flexibility in the maximum allowable reactor temperature and the method of introducing the air into the reactor.

While Setzer et al. does disclose the catalyst bed being provided with promoted catalyst, the reference does not explicitly disclose the bed being promoted with a noble metal catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F.

As promoters containing noble metal, were well known in the art at the time the invention was made (as evidenced by Peters (USP 5,110,780)), and as the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal-promoted catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F in said catalyst bed, as disclosed by Setzer et al., in view of Narumiya et al. for the purpose of increasing catalyst activity and lowering operation temperature.

10. Claim 22, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Setzer et al. (USP 4,451,578), in view of Narumiya et al. (USP 4,308,233).

Setzer et al. discloses a similar autothermal reformer assembly comprising:

- a catalyst bed (C5/L41);
- said catalyst bed including an inlet portion of said catalyst bed being provided with promoted catalyst (C2/L29-30), which is operable to combust a portion of the fuel gas (C5/L54-59);

While Setzer et al. does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a monolithic open cell foam.

With reference to Narumiya et al. the same comments apply as set forth above.

While Setzer et al. does not explicitly disclose the catalyst bed having an inlet end and an outlet end, these elements are inherent in the disclosed assembly.

While Setzer et al. does disclose the catalyst bed being provided with promoted catalyst, the reference does not explicitly disclose the bed being promoted with a noble metal catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F.

As promoters containing noble metal, were well known in the art at the time the invention was made (as evidenced by Peters (USP 5,110,780)), and as the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal-promoted catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F in said catalyst bed, as disclosed by Setzer et al., in view of Narumiya et al. for the purpose of increasing catalyst activity and lowering operation temperature.

Response to Amendment

11. Requested amendment to page 5, line 28 of specification has not been entered. The request to delete "small" and insert --smaller-- is not clear as in said line word "small" appears more than once.

12. Requested amendment to claim 20 has not been entered as claim 20 was cancelled by the applicant. Request for cancellation of claim 20 can be found on page 1 of Amendment A.

Response to Arguments

13. Applicant's arguments filed on 24 August 2000 have been fully considered but they are not persuasive.

14. Regarding objection to the specification and rejection of claims 1 and 21-22 due to use of the phrase "catalyzed calls" the applicant argues that said objections and rejections are groundless because phrase "catalyzed calls" does not appear anywhere in the specification nor in said claims.

The examiner regrets a typographical error which changed "catalyzed cells" to "catalyzed calls" in said objection and rejection, but it is examiner's position that the meaning of said objection and rejection was made clear regardless of said error. A clarification of said objection and rejection was provided in sentences following the first sentence, which read: "Are cells of the catalyst bed being changed by a catalytic reaction (being catalyzed)? Is the catalyst used to catalyze cells of the catalyst bed in addition to catalyzing the reforming reaction of fuel gas?"

15. The applicant argues that many of examiners rejections under 35 U.S.C 112(2) are not proper because said statute is directed to those skilled in the art in question and not to examiners in the USPTO.

In response the examiner notes that she can be considered one of ordinary skill in the art, as the art area applicable in the instant invention is that of hydrocarbon reforming, and one of ordinary skill in this art is considered to have at least a BS degree, with additional education in the field and at least 3 years practical experience working in the art; is aware of the state of the art as shown by the references of record, to include those cited by applicants and the examiner (*ESSO Research & Engineering V Kahn & Co.*, 183 USPQ 582 1974) and who is presumed to know something about the art apart from what references alone teach (*In re Bode*, 193 USPQ 12, (16) CCPA 1977); and who is motivated by economics to depart from the prior art to reduce costs

consistent with the desired product characteristics. *In re Clinton* 188 USPQ 365, 367 (CCPA 1976) and *In re Thompson* 192 USPQ 275, 277 (CCPA 1976).

16. The applicant argues that rejection of claims 1 and 21-22 due to use of "the fuel gas" is not proper, as phrase "fuel gas" is recited in line 1 of each of these claims.

In response the examiner would like to point out that while recitation "A hydrocarbon fuel gas autothermal reformer assembly", as recited in line 1 of claims 1 and 21-22, does establish antecedent basis for reformer assembly, it does not do so for fuel gas. Currently, fuel gas is not positively recited in any of said claims.

Further, the examiner notes that counting how many times the phrase "fuel gas" is used in the specification and claims will not overcome mentioned above rejection of claims 1 and 21-22, but said rejection can be overcome by amending the claims by deleting "the fuel gas" in line 4 of claims 1 and 21-22 and inserting --a fuel gas--.

17. The applicant argues that rejection of claims 1-19 and 21-22 as being incomplete is not proper because section of MPEP cited be examiner, specifically MPEP § 2172.01 provides guidance for 35 U.S.C 112(1) rejections and not for 35 U.S.C 112(2) rejections.

While said rejection of claims 1-19 and 21-22 has been withdrawn, the examiner would like to point out that MPEP § 2172.01 states that:

> "(...) a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under **35 U.S.C. 112, second paragraph**, for failure to point out and distinctly claim the invention. See *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976); *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968)." Emphasis added.

18. The applicant argues that there is not motivation to substitute the Narumiya et al. catalyst bed for the Clawson catalyst bed because it appears that reformer of Clawson does not have problems which would be solved by catalyst bed which allows the fuel gas to always be in contact

with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas. Further the applicant argues that one would not be likely to use an oxidizing catalyst bed in a steam reformer, because if one did make such substitution the result would be to oxidize or burn all of the hydrocarbons in the fuel gas, which would be an undesirable result in steam reformer.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Narumiya et al., in C2/L24-31, states that disclosed catalyst structure allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas. Since this structure improves conversion, it will enhance performance of any catalytic device.

Further the examiner notes that Narumiya et al. was not relied upon to teach using an oxidizing catalyst in a steam reformer.

The examiner has however relied on the disclosure of Narumiya et al. to teach a cylindrical monolithic open cell foam structure (Fig. 1, C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the

fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

19. The applicant argues that the examiner's analysis of Clawson is incorrect, because numeral 208 in Clawson denotes initial portion of catalyst bed filled with catalyst 214 and not the fuel gas inlet, said fuel gas inlet being denoted by numeral 219. Therefore, as the fuel gas inlet passage 219 is not disposed in heat exchange relationship with processed gas passage, the pre-heating of the fuel gas stream as claimed in instant application does not occur.

In response the examiner notes that Fig. 3 of Clawson shows a passage 208 in heat exchange relationship with passage 224. A gas stream to be reformed by catalyst 225 contained in said passage 224 to form processed gas enters through said passage 208, therefore said passage 208 is a fuel gas inlet passage.

Further the examiner notes that the instant claim language: "a hydrocarbon fuel gas autothermal reformer assembly comprising (...)" does not distinguish between the instant invention and the reformer assembly disclosed by Clawson, as said language does not exclude reformer assemblies wherein a fuel gas inlet passage further comprises a catalyst.

Additionally, the examiner would like to point out that passage 219 is also in heat exchange relationship with processed fuel gas stream outlet passage 224, as passage 219 comes in contact with reformer 200 and reformer 200 comprises passage 224. Therefore there is a heat exchange between said passages 219 and 224.

In response to applicant's argument that the references fail to show certain features of applicant's invention, the examiner notes that the features upon which applicant relies (i.e., pre-heating of the fuel gas) are not recited in the rejected claim(s), as said claims merely recite heat exchange relationship, "whereby heat will be transferred to said fuel gas inlet passage from the

processed gas stream". Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

20. The applicant argues that Setzer et al. '484 does not teach a foam core catalyst.

In response the examiner notes that Setzer et al. '484 was not relied upon to teach foam catalyst regardless typographical error which included phrase "foam core" in rejection on page 11.

The examiner has however relied on the disclosure of Narumiya et al. to teach a cylindrical monolithic open cell foam structure (Fig. 1, C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

21. The applicant argues that reference of Sheller does not disclose a "monolithic" catalyst, but rather a catalyst bed formed from a plurality of corrugated metal strips.

In response the examiner notes that Sheller was not relied upon to teach monolithic catalyst.

The examiner has however relied on the disclosure of Narumiya et al. to teach a cylindrical monolithic open cell foam structure (Fig. 1, C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the

fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

Further, the examiner notes that Sheller, in C1/L53-C2/L16 in fact does teach a monolithic catalyst bed, wherein:

- said catalyst bed includes a metal support selected from the group consisting of stainless steel, nickel alloys and iron-aluminum alloys (C1/L26-29);
- said metal support is connected to a source of electrical current, so as to serve as a resistance heating element (C1/L52-63);
- said metal support is electrically heated to operating temperature within about twenty seconds of applying electrical current thereto (C1/L65-66).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a metal support connected to a source of electrical current, as taught by Sheller, in the catalyst bed of Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of activating the catalyst during the start up of the reformer.

22. The applicant argues that combination of references used to reject claims 21-22 does not disclose a reformer assembly which combusts a portion of the fuel gas at a temperature of about 500°F to enable start-up of the reformer assembly.

In response the examiner notes that said reference combination was not relied upon to disclose a reformer assembly which combusts a portion of the fuel gas at a temperature of about 500°F.

The examiner has however relied on said reference combination to disclose reformer assembly which is operable to combusts a portion of the fuel gas at a temperature of about 500°F, as the term operable means "being such that use or operation is possible" (*The American*

Heritage® Dictionary of the English Language, Third Edition copyright © 1992 by Houghton Mifflin Company; Electronic version licensed from INSO Corporation). As combustion of a portion of the fuel gas stream at a temperature of about 500°F does not impart any further structural limitations on the reformer assemblage as disclosed by said combination of references, it is examiner's position that said reformer assemblage is operable to combusts a portion of the fuel gas at a temperature of about 500°F.

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (703) 305-5418. The examiner can normally be reached on Monday through Thursday, from 6:45 AM to 5:15 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian Knode, can be reached on (703) 308-4311.

The fax phone number for Group 1700 is (703) 305-3599 (for Official papers after Final), (703) 305-5408 (for other Official papers) and (703) 305-6078 (for Unofficial papers). When

filing a fax in Group 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are not for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Basia Ridley
Examiner
Art Unit 1764

BR
October 25, 2000

Hien Tran

HIEN TRAN
PRIMARY EXAMINER